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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,617	10/22/2003	Satoru Okamoto	12732-170001	4799

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FISH & RICHARDSON P.C.  
P.O. BOX 1022  
MINNEAPOLIS, MN 55440-1022

EXAMINER
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VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 08/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/689,617

Applicant(s)

OKAMOTO, SATORU

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-95 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 85-95 is/are allowed.
- 6) ☒ Claim(s) 1-84 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 102203.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Ye et al (US 5,765,400)

Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

filling a chamber with Cl<sub>2</sub> (col 12, lines 40-43), wherein BO<sub>x</sub> is adhered to an inside of the chamber as a residue (Table 1)

generating plasma from the Cl<sub>2</sub> or the mixed gas of Cl<sub>2</sub> and the fluorine-based gas to remove the contaminant from the process chamber surface/ BO<sub>x</sub> (col 11, lines 41-45; col 12, lines 52-55)

Regarding claim 2, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 3-4, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 5-7, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

3. Claims 8-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Ye et al (US 5,765,400)

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Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

performing plasma etching using a gas containing BCl<sub>3</sub> as an etching gas in the chamber (col 12, lines 40-45), changing/replacing the etching gas with Cl<sub>2</sub> or a mixed of SF<sub>6</sub>/Cl<sub>2</sub> after the plasma etching (col 12, lines 52-54), generating plasma from SF<sub>6</sub>/Cl<sub>2</sub> (col 13, lines 40-44)

Regarding claim 9, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 10-11, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 12-14, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

4. Claims 15-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Ye et al (US 5,765,400)

Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

performing plasma etching using a gas containing BCl<sub>3</sub> as an etching gas in the chamber (col 12, lines 40-45), changing/replacing the etching gas with Cl<sub>2</sub> after the plasma etching (col 12, lines 52-54), generating plasma from Cl<sub>2</sub> (col 15, lines 4-5) and then plasma etching using SF<sub>6</sub>/Cl<sub>2</sub> mixture to completely clean the chamber surface (col 15, lines 6-8), which reads on plasma etching using a gas that is inhibited from generating plasma by Box

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Regarding claims 16, 23, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 17-18, 24-25, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 19-21, 27-28, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

5. Claims 57-63 are rejected under 35 U.S.C. 102(b) as being anticipated by Ye et al (US 5,765,400)

Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

performing plasma etching an aluminum/conductive film using a gas containing BCl<sub>3</sub> as an etching gas in the chamber (col 12, lines 40-45), changing/replacing the etching gas with Cl<sub>2</sub> after the plasma etching (col 12, lines 52-54), generating plasma from Cl<sub>2</sub> (col 15, lines 4-5) and then plasma etching using SF<sub>6</sub>/Cl<sub>2</sub> mixture to completely clean the chamber surface (col 15, lines 6-8), which reads on plasma etching using a gas that is inhibited from generating plasma by Box

Regarding claim 58, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 59-60, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 61-63, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

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6. Claims 64-70 are rejected under 35 U.S.C. 102(b) as being anticipated by Ye et al (US 5,765,400)

Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

performing plasma etching using a gas containing BCl<sub>3</sub> as an etching gas in the chamber (col 12, lines 40-45), changing/replacing the etching gas with Cl<sub>2</sub> after the plasma etching (col 12, lines 52-54), generating plasma from Cl<sub>2</sub> (col 15, lines 4-5) and then plasma etching using SF<sub>6</sub>/Cl<sub>2</sub> mixture to completely clean the chamber surface (col 15, lines 6-8)

Regarding claim 65, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 66-67, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 68-70, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 29-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al (US 5,765,400) in view of Fisher et al (US 4,832,779)

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Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

filling a chamber with Cl<sub>2</sub> (col 12, lines 40-43), wherein BO<sub>x</sub> is adhered to an inside of the chamber as a residue (Table 1)

generating plasma from the Cl<sub>2</sub> or the mixed gas of Cl<sub>2</sub> and the fluorine-based gas to remove the contaminant from the process chamber surface/ BO<sub>x</sub> (col 11, lines 41-45; col 12, lines 52-55)

Unlike the instant claimed invention as per claim 29, Ye fails to disclose that a part of the chamber is made from quartz and a surface of the quartz is partially exposed

Fisher discloses a method for plasma processing wafer in a chamber having a part made from quartz and a surface of the quartz is partially exposed inside the chamber (col 18, lines 45-47)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Ye method by using a quartz part in the chamber as per Fisher because Fisher discloses that since the surface of the quartz is highly insulating, the plasma boundary near the quartz will not have as much voltage nor as much current across it as the plasma boundary near a grounded conductive element would (col 18, lines 47-50)

Regarding claim 30, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 31-32, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 33-35, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

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9. Claims 36-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al (US 5,765,400) in view of Fisher et al (US 4,832,779)

Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

performing plasma etching using a gas containing BCl<sub>3</sub> as an etching gas in the chamber (col 12, lines 40-45), changing/replacing the etching gas with Cl<sub>2</sub> or a mixed of SF<sub>6</sub>/Cl<sub>2</sub> after the plasma etching (col 12, lines 52-54), generating plasma from SF<sub>6</sub>/Cl<sub>2</sub> (col 13, lines 40-44)

Unlike the instant claimed invention as per claim 36, Ye fails to disclose that a part of the chamber is made from quartz and a surface of the quartz is partially exposed to an inside of chamber

Fisher discloses a method for plasma processing wafer in a chamber having a part made from quartz and a surface of the quartz is partially exposed inside the chamber (col 18, lines 45-47)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Ye method by using a quartz part in the chamber as per Fisher because Fisher discloses that since the surface of the quartz is highly insulating, the plasma boundary near the quartz will not have as much voltage nor as much current across it as the plasma boundary near a grounded conductive element would (col 18, lines 47-50)

Regarding claim 37, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 38-39, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)



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Regarding claims 40-42, Ye discloses adding oxygen gas to the cleaning plasma including SF6 (col 10, lines 45-47)

8. Claims 43-56, 71-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al (US 5,765,400) in view of Fisher et al (US 4,832,779)

Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

performing plasma etching using a gas containing BCl<sub>3</sub> as an etching gas in the chamber (col 12, lines 40-45), changing/replacing the etching gas with Cl<sub>2</sub> after the plasma etching (col 12, lines 52-54), generating plasma from Cl<sub>2</sub> (col 15, lines 4-5) and then plasma etching using SF<sub>6</sub>/Cl<sub>2</sub> mixture to completely clean the chamber surface (col 15, lines 6-8), which reads on plasma etching using a gas that is inhibited from generating plasma by BO<sub>x</sub>

Unlike the instant claimed inventions as per claims 43, 50, 71, Ye fails to disclose that a part of the chamber is made from quartz and a surface of the quartz is partially exposed to an inside of chamber

Fisher discloses a method for plasma processing wafer in a chamber having a part made from quartz and a surface of the quartz is partially exposed inside the chamber (col 18, lines 45-47)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Ye method by using a quartz part in the chamber as per Fisher because Fisher discloses that since the surface of the quartz is highly insulating, the

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plasma boundary near the quartz will not have as much voltage nor as much current across it as the plasma boundary near a grounded conductive element would (col 18, lines 47-50)

Regarding claims 44, 51, 72, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 45-46, 52-53, 73-74, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 49-49, 54-56, 75-77, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

9. Claims 78-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ye et al (US 5,765,400) in view of Fisher et al (US 4,832,779)

Ye discloses a method for cleaning a plasma etching apparatus comprising the steps of:

performing plasma etching using a gas containing BCl<sub>3</sub> as an etching gas in the chamber (col 12, lines 40-45), changing/replacing the etching gas with Cl<sub>2</sub> after the plasma etching (col 12, lines 52-54), generating plasma from Cl<sub>2</sub> (col 15, lines 4-5) and then plasma etching using SF<sub>6</sub>/Cl<sub>2</sub> mixture to completely clean the chamber surface (col 15, lines 6-8)

Unlike the instant claimed inventions as per claim 78, Ye fails to disclose that a part of the chamber is made from quartz and a surface of the quartz is partially exposed to an inside of chamber

Fisher discloses a method for plasma processing wafer in a chamber having a part made from quartz and a surface of the quartz is partially exposed inside the chamber (col 18, lines 45-47)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Ye method by using a quart part in the chamber as per Fisher because Fisher discloses that since the surface of the quartz is highly insulating, the plasma boundary near the quartz will not have as much voltage nor as much current across it as the plasma boundary near a grounded conductive element would (col 18, lines 47-50)

Regarding claim 79, Ye discloses using an ICP etching method (col 14, lines 9-10)

Regarding claims 80-81, Ye discloses that the fluorine gas is SF<sub>6</sub> (col 10, lines 46-48)

Regarding claims 82-84, Ye discloses adding oxygen gas to the cleaning plasma including SF<sub>6</sub> (col 10, lines 45-47)

#### ***Allowable Subject Matter***

10. Claims 85-95 are allowed.

The following is an examiner's statement of reasons for allowance:

Regarding claim 85, the cited prior art of record fails to disclose or suggest a method for manufacturing a semiconductor device comprises the step of "etching the first conductive film.....a first etching gas", in combination with the rest of the limitations of claim 85.

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***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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August 3, 2005